Memorandum of Understanding

between the

University of Minnesota

and

Fermi National Accelerator Laboratory

for

Operation of the Soudan Laboratory

as part of the

Fermilab Research Program

March 2003

DRAFT 2.0

This Memorandum of Understanding has been prepared to outline the basic principles of understanding among the interested parties in regards to the operation of the Soudan Laboratory for experiments carried out at the Laboratory which are approved and funded by Fermi National Accelerator Laboratory.

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Introduction

The Soudan Underground Laboratory (SUL) is a unique research site operated by the School of Physics and Astronomy of the University of Minnesota. It is located in the Soudan Underground Mine State Park where the State of Minnesota, Department of Natural Resources (DNR) preserves the oldest iron mine in Minnesota. The Soudan Underground Laboratory site is leased by the University of Minnesota from the DNR. A surface facility building is also leased by the University from Breitung Township. In this document the underground facilities and the surface facility are collectively referred to as the Soudan Laboratory.

The first physics experiments at the Soudan Laboratory were carried out using the Soudan1 and Soudan2 detectors. These experiments focused on three major topics: the stability of matter (nucleon decay), the interactions of the cosmic (atmospheric) neutrinos, and the properties of cosmic rays. The cavern for the Soudan2 experiment was constructed between 1984 and 1986. Since the Laboratory's inception in 1983, the research activities at the Laboratory have been managed by a Principal Investigator on the dominant research contract funding the activities, namely the University of Minnesota's High Energy Physics grant from the Department of Energy's University Programs for the funding of the Soudan2 experiment.

As described below, the expansion of activities at the Laboratory to include experiment construction funded by the U.S. Department of Energy, through the Fermi National Accelerator Laboratory, have dictated that the original management model is no longer adequate or appropriate. In the sections which follow, a plan is laid out for the management and basic operation of the research facilities at the Soudan Laboratory for currently approved and funded experimental programs. **Further expansion of the experimental program or completion of the currently approved experiments will initiate a review and revision of the plan for continued funding and operation of the Laboratory.**

In 1995 Fermi National Accelerator Laboratory (Fermilab) approved and began the process of funding the MINOS Experiment (E-875). MINOS proposed to use a new neutrino beam to be constructed at Fermilab and directed through the earth's crust to the Soudan Laboratory where the MINOS far detector would be installed in a new cavern to be constructed

specifically for the MINOS experiment. In 1998 Fermilab approved funding for the CDMSII experiment which would be installed and operated at the Soudan Laboratory in the existing Soudan2 cavern. At the present time (May 2003) detectors for both experiments are under construction. The MINOS experiment will complete construction in July 2003. *CDMSII anticipates completion of construction in (?) 2004.* This document represents an understanding between Fermilab and the University of Minnesota concerning the responsibilities of each associated with the use of the Soudan Laboratory for the operation of Fermilab approved experiments. Roles, responsibilities and funding arrangements that are specific to the construction and/or operation of the individual experiments are covered in separate MOU's and Statements of Work (SOW) for each program. The plans described herein are not contractual obligations but represent the current understanding of the parties. Commitments for funding are subject to the normal uncertainties of federal funding. This MOU can be amended by mutual agreement as projects proceed.

Management of the Laboratory

The Soudan Laboratory is operated by the School of Physics and Astronomy at the University of Minnesota. Management oversight is provided by both the University of Minnesota Management Group and the Fermi National Accelerator Laboratory (Fermilab), as described below. If at some future time Fermilab is not the primary source of funding for the Laboratory operations the Fermilab oversight role will be appropriately reevaluated or terminated.

University of Minnesota

General Responsibilities

The University of Minnesota shall be responsible for coordinating and negotiating with the Minnesota Department of Natural Resources concerning all matters pertaining to the lease of space in the Soudan Underground Mine. Costs associated with the leased spaces are considered to be operations costs of the relevant experiments. These leases define terms and conditions for the occupancy of the premises, and it is the responsibility of the University to recognize and enforce these.

The University is also responsible for a lease with the Township of Breitung that covers a 7-year rental *(commencing in 2000 ??)* of a surface facility for the MINOS experiment.

Any increases in the cost of occupying the facility, beyond normal inflation must be agreed to by Fermilab before the University agrees to the new terms of the lease.

Any construction of facilities in the laboratories is the responsibility of the University, which is the relevant code enforcement agency. Construction supervision will be done by the laboratory staff, when appropriate, or by an outside consultant hired by the University.

The University of Minnesota will be responsible for requiring that all applicable safety standards are followed during the installation and operation of experiments located in the laboratory. In addition, the University of Minnesota will be responsible for the mitigation of the requirements of the Environmental Assessment Worksheet (EAW), including mitigation of the high sulfur excavated rock to Minnesota Pollution Control Agency standards, control of water quality from excavation and operation, monitoring the resident bat population and obtaining all required permissions for modifications to historic structures from the Minnesota State Historical Preservation Office and the Advisory Council on Historic Preservation.

The operational safety responsibility for the laboratory lies with the University. The laboratory safety officer is responsible for maintaining a safe working environment, training permanent staff in safety procedures and conducting training sessions for visiting personnel. **The safety officer reports to the University Department of Environmental Health and Safety, and coordinates policies and equipment with the DNR.**

The University of Minnesota will accept funding from Fermilab for construction and operation of experiments at the Soudan Laboratory. The University will collect overhead charges on this funding at the following rates :

Purchase of Capital Equipment (including Civil Construction)	0%
Payments to DNR	26%

Materials and Services 26%

One half of these overhead charges are allocated towards Internal Cost recovery (ICR) of the $3 million internal loan granted from the University to the Institute of Technology (IT) to initiate construction of the MIINOS Cavern.

University of Minnesota Management Group

The University of Minnesota has established the Soudan Laboratory Management Group. Members of the group include :

A representative of the Dean of the Institute of Technology (head)

The Laboratory Director

An additional faculty member of the School of Physics and Astronomy

The Head of the School of Physics and Astronomy

A representative of the Vice President for Research and Dean of the Graduate School

Meetings of the Management Group will be convened by the representative of the Vice President for Research and Dean of the Graduate School.

The Management Group will meet regularly to hear presentations by the Laboratory Director on Laboratory operations and budgets. Any new initiatives proposed for the Laboratory must be presented to and ultimately approved by the Management Group. Note that approval by the Management Group does not indicate that the projects are guaranteed funding from non-University sources.

The Management Group will advise the Laboratory Director on budget matters.

Soudan Laboratory Director

The University of Minnesota will appoint a Soudan Laboratory Director who will be the primary point of contact for the University's responsibilities at the Laboratory. The Director will be responsible for the operation of the Laboratory, subject to the oversight of the Management Group. The Soudan Laboratory Director will be a member of the faculty of the School of Physics and Astronomy**. The Laboratory Director will serve at the pleasure of the University of Minnesota Vice President for Research and, under the conditions set forth in this Memorandum of Understanding, the Director of Fermilab.**

Responsibilities of the Soudan Laboratory Director include but are not limited to :

Safe and efficient operation of the facility. This includes the authority to stop work by any individual or organization that the Director determines may jeopardize the safety of individuals or equipment within the Laboratory. The Director may delegate this authority to Laboratory staff or users as appropriate.

Operation of the Laboratory within the allocated budgets. This includes timely notification of the Experiment Project Managers and/or Soudan Operations Manager from Fermilab of any unexpected activities or expenses that are outside of approved and funded MOU's or Statements of Work that will cause a budget overrun.

Preparation of annual funding request to cover expenses required to maintain the safe and efficient operation of the base facility that are not specifically authorized and funded in otherwise approved and funded SOW's.

Management of University accounts which are funded by outside agencies, i.e Fermilab, via direct grants or purchase orders and used to reimburse the University for the expenses which are incurred at the Laboratory and paid for by the University. This management includes but is not limited to transfers between accounts required so that all charges are ultimately paid from the appropriate source of funding. Such reconciliation of accounts should be made no less frequently than semi-annually. **Fermilab requires that all accounts funded by**

Fermilab be closed at the end of the Federal fiscal year (September) and all reimbursable expenses for the year be invoiced before the end of the calendar year.

Appointment or termination of permanent Laboratory staff, consistent with approved and funded budgets and laboratory activities. The Laboratory director will notify the Operations Manager of any University mandated increases in salary or fringe benefit rates for the Laboratory staff. **Non-mandated increases will be allocated only after consultation with and approval of the Project or Operations Manager whose budget is responsible covering for the salary increase.**

Coordination and negotiation with the Minnesota Department of Natural Resources concerning all matters pertaining to activities at the Laboratory. These matters include but are not necessarily limited to :

- the lease of cavern space
- monetary charges for use of space, electricity, the hoist and DNR labor associated with the presence of the laboratory and related research activities

The Laboratory Director will review the monthly invoices and payments made to the DNR and initiate measures to correct any errors in charges or accounting.

The Laboratory Director will notify the Operations Manager of any DNR mandated increases in the charge for any of the services provided. The Laboratory Director will then work with the Project and Operations manager to make adjustments to the budget plan to accommodate the increase without allowing a budget over run.

Soudan Laboratory Supervisor

The Laboratory Director will appoint the Soudan Laboratory Supervisor. The Laboratory Supervisor is resident in the near vicinity of the Laboratory.

The responsibilities of the Supervisor include, but are not necessarily limited to :

Direct supervision of the Laboratory Staff

Coordination of daily activities at the Laboratory, including arranging experimenters and contractors access to the Laboratory in the most safe and efficient manner.

Assignment of appropriate Laboratory Staff to tasks required for basic facility operation as well as specific tasks outlined in Memoranda of Understanding and/or Statements of Work

Authorization of time sheets for Laboratory staff, including review and approval of effort reporting to appropriate project codes

Participate (with Laboratory Director) in staff hiring and termination actions consistent with approved and funded staffing plans as outlined in Memoranda of Understanding and/or Statements of Work

Assist the Laboratory Director with oversight and management of the General Operations budget which covers materials and services required to maintain the safe and efficient operation of the base facility that are not specifically authorized and funded in approved and otherwise funded SOW's.

Review monthly invoices from the DNR and inform the Laboratory Director of charges (not covered by construction contracts) in excess of 15% the budgeted allocation for that month.

Submit monthly reports for hours worked and operating expenditures at the Laboratory to the Laboratory Director and the Soudan Operations Manager from Fermilab.

Submit copies of the monthly invoices from the DNR to the Soudan Operations Manager.

Fermilab

General Responsibilities

As outlined in this Memorandum of Understanding and other documents herein referenced [1,2,3], Fermilab is the organization primarily responsible

for funding the research program at the Soudan Laboratory. Specific methods of funding are described in each Memorandum and include but are not necessarily limited to :

Assistance Grants, whereby funds are directly transferred from the granting agency to the University of Minnesota;

Purchase Orders, whereby Fermilab Project Managers or the Operations Manager issue a Puchase Order to the University, which will subsequently invoice Fermilab for payment upon completion of the work.

In both cases the work to be carried out will be specifically itemized in a Memorandum of Understanding or in Statements of Work issued at appropriate intervals.

Funds transferred from Fermilab via Purchase Order will be subject to the Fermilab G&A rate applicable to the magnitude of the Purchase Order. Purchase Orders for long-term operation which will surpass $500K are eligible for the G&A pass-through rate of 1.5% on the first $500K and 0% thereafter.

Project Management Groups

For each experiment or project approved and funded by Fermilab for operations at the Soudan Laboratory, the Fermilab Deputy Director will appoint a Project Management Group (PMG). The Deputy Director will convene regular meetings of the PMG. The membership and responsibilities of the PMG are outlined in the Project Management plans for each project.

Soudan Operations Manager from Fermilab

The Fermilab Director will appoint a Soudan Operations Manager from Fermilab. The Operations Manager is a Fermilab Scientist who reports to the Head of the Particle Physics Division.

The role of the Operations Manager is to provide coordination and support to the Soudan Laboratory Director and the Experiment Specific Project Managers specifically in regard to the preparation of budgets required for the

non-experiment specific facility operation. Responsibilities of the Operations Manager include but are not limited to :

Preparation and maintenance of this Memorandum of Understanding.

Preparation and maintenance of the Memorandum of Understanding for the operation of the MINOS Experiment [3].

Review and approval of the Memorandum of Understanding for the CDMSII experiment.

Preparation of an annual Facility Operations budget which will provide the funds required to ensure safe and efficient operation of the facility that are not otherwise provided by the budgets of the projects or experiments that are being constructed or operated in the Laboratory.

Preparation of Statements of Work (Quarterly or as needed) to cover the Facility operation budget.

Preparation and tracking of the of the Purchase Orders which provide the Facility Operation funding.

Attendance at the periodic meetings of the University of Minnesota Management Group

Experiment Specific Project Managers

For each project/experiment approved and funded by Fermilab, the Fermilab Director appoints a Project Manager. Specific roles and responsibilities of the experiment project managers are outlined in the individual MOU's. Experiment Specific Project Managers work in conjunction with the Operations Manager to ensure that the activities at the Laboratory, including the transition from experiment construction to operation are funded and supported in a consistent and efficient manner.

Laboratory Operations

Operation of the Laboratory is defined as the labor, materials and services required to provide the infrastructure and maintenance thereof, that is not specifically and uniquely assigned to the requirements of one of the experiments using the facility. In this Memorandum of Understanding these needs are addressed as they apply to the Fermilab initiated experimental programs being operated and installed at the Laboratory.

Facility Operations

These basic services include, but are not necessarily limited to :

- Access to the laboratory for experimenters and contractors (i.e. cage riding supervision)
- Basic communications and computer services including telephone, E-mail, FAX, WEB serving and printing
- Services for drinking and washing water, lunch rooms, waste services and janitorial functions
- Experimenter access to basic laboratory tools, machine shop services and electronics repair assistance
- Maintenance of laboratory facilities, basic lighting and electrical service, air-handling equipment, cranes, forklifts and pallet jacks.
- Safety services, including Operation authorization for equipment, MDS's (Material Data Safety sheets) and supervision of construction/repair activities
- Coordination and scheduling of laboratory access and services.

This base operation of the Laboratory is provided – in addition to experiment-related services – during experiment mobilization, operation and decommissioning phases.

Exclusive of salaries for the Laboratory Staff and infrastructure improvements, the materials and services associated with this base operation is estimated to be about $40K per month (FY03 $$s). Note this does not include the cost of electricity associated with the operation of the experimental equipment, nor does it include the DNR costs for hoist operation since these annual costs depend on a specific model of operation of the experimental program.

Laboratory Staff

The above services are provided by the staff of the Soudan Laboratory, who are employees of the University of Minnesota. The salaries, wages and fringe benefits (SWF) of the staff are paid by the University which is or will be reimbursed for these salaries by the following sources of funds :

1) Fermilab/MINOS Project Operating Funds (for basic laboratory support during the construction and installation phase of the MINOS experiment)
2) Fermilab/CDMSII Experiment Operating Funds
3) Fermilab/MINOS Experiment Operating Funds
4) Fermilab/Soudan Laboratory Operating Budget

It is estimated that 3 FTE's are required to supply the minimum base operations at the Laboratory. It is understood that the level of staff which will be supported after the experiment construction projects have been completed will be determined only after each experiment has presented a plan for the means and methods by which routine operations and data taking will be accomplished. Final determination of the Laboratory Staff size will be based on needs and available budget.

Laboratory Infrastructure

It is recognized by all parties that improvements to the infrastructure at the Laboratory may become necessary or desirable to maintain the safe and efficient operation of the experimental program. Funding for infrastructure improvements will be allocated once a plan that fits within the current annual budgets is agreed upon. Improvements such as network connections between Fermilab and the Soudan Laboratory will receive high priority for planning and budget allocations.

Laboratory Expansion

Proposals of plans for expansion of the current experimental program will be presented for consideration and review by the University of Minnesota Management Group. Proposals which would anticipate receiving funding from Fermilab will be expected to follow the normal Fermilab procedure for experiment approvals. Until such a proposal would be accepted for consideration by the Fermilab Director and additional funding allocated, Fermilab funding for the current programs should only be used for the development of new proposals after joint concurrence of the Laboratory Director and the Fermilab Soudan Operations Manager.

Department of Natural Resources (DNR)

The Department of Natural Resources provides services to the University of Minnesota for the operation of the Soudan Underground Laboratory. Charges are made on the basis of full cost recovery. The DNR attempts to allocate the charges to the appropriate aspect of the Laboratory Operations.
The DNR directly invoices the University on a monthly basis. The University pays the invoice. Subsequently the Laboratory Director is notified that payment has been made.

Experiment Specific Operations

Each experiment which is approved and funded by Fermilab will negotiate a Memorandum of Understanding between Fermilab and the University of Minnesota which clearly outlines the scope of support that will be provided by Fermilab for the operation of that experiment. The source of operating funds will be through the Fermilab Particle Physics Division. The amount of funding to be allocated annually will be negotiated between the Head of the Particle Physics Division and the experiment Project or Operations Manager in consultation with the experiment spokesperson and the Soudan Laboratory Director.

Work Breakdown Structure for Facility Operation

The budget for Facility Operations will be allocated according to the Work Breakdown Structure outlined below.

4.1	**Facility Operations FY01**
4.1.1	**Mine Crew Salary**
4.1.1.1	Crew Supervisor
4.1.1.2	Safety Officer
4.1.1.3	Systems Administrator
4.1.1.4	Office Assistant
4.4.1.5	Facility Housekeeping
4.1.2	**DNR**
4.1.2.1	Electricity
4.1.2.2	Hoist Trips
4.1.2.3	Hoistman
4.1.2.4	Labor
4.1.2.5	MINOS Cavern Lease
4.1.3	**Surface Building**
4.1.3.1	Lease
4.1.3.2	Utilities
4.1.4	**Water &Waste Management**
4.1.5	**Comm/Network/Comp**
	Telephone
	Networking Fees
	Computer maintenance
4.1.6	**Auto**
	Car Rental, Gas, Maintenance
	Other
4.1.7	**Safety Equip/Improv**
4.1.8	**Supplies**
4.1.9	**Services**
4.1.10	**Equipment Maint/Repair**

Notes :

1) All DNR electricity charges, not directly covered in a construction contract are budgeted in 4.1.2.
2) All Communication and Networking Expenses (not equipment installation) are allocated in 4.1.5.
3) Chargebacks from non-MINOS activites that can be accounted for will be made whenever possible.

REFERENCES

[1] MOU between the University of Minnesota and Fermi National Accelerator Laboratory for the. Construction of an Experimental Area for and Installation of the MINOS Detector at The Soudan Underground Laboratory, October 2000

[2] Interim Memorandum of Understanding between the University of Minnesota and Fermi National Accelerator Laboratory for Installation and and Operation of the Cryogenic Dark Matter Search Experiment in the Soudan Underground Laboratory, September 2000.

[3] A Memorandum of Understanding for the operation of the MINOS experiment will be developed prior to the completion of construction and the official start of detector beam related operations.